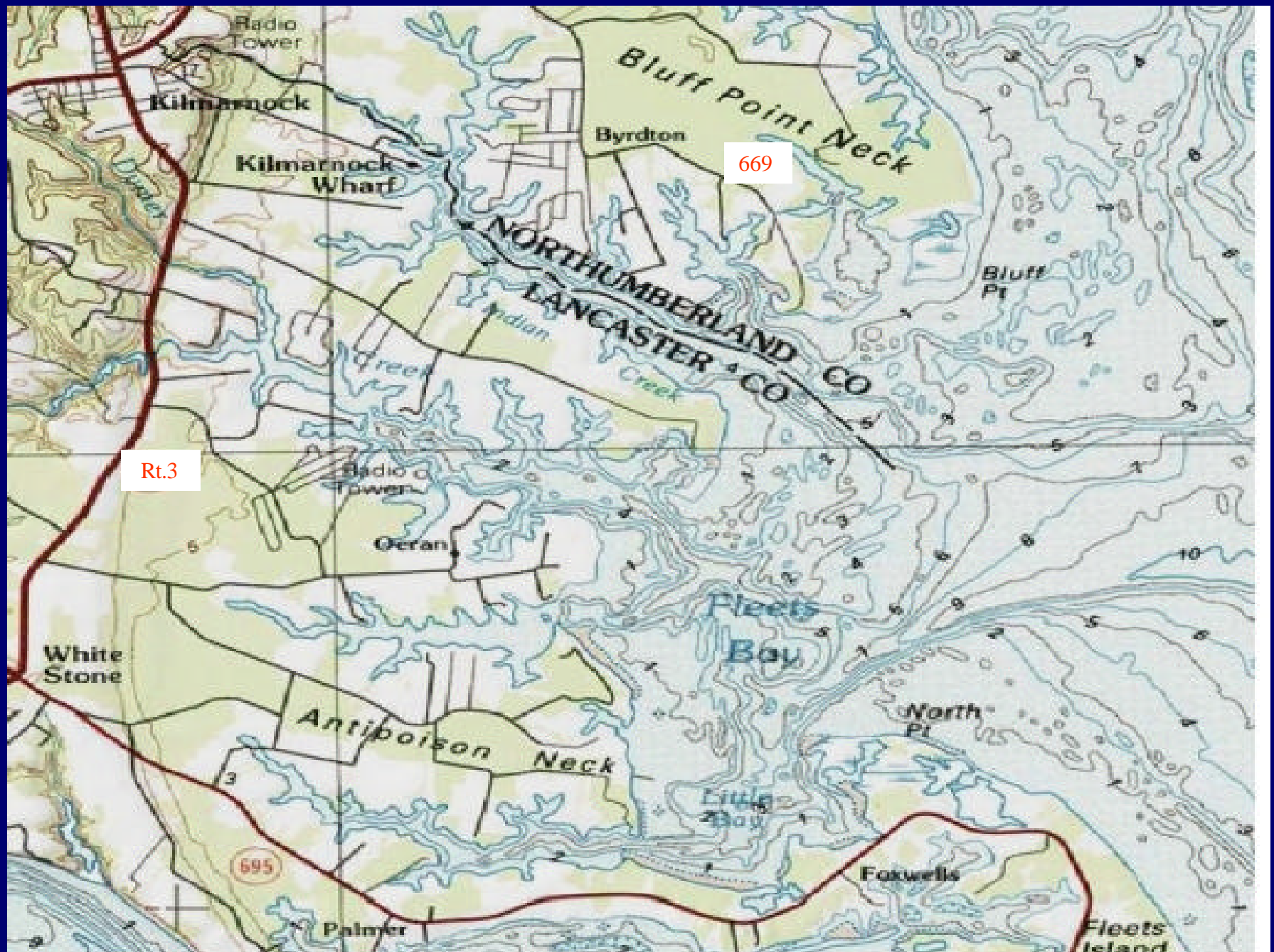# Bacteria TMDL for Shellfish Waters in Indian, Dymer, Tabbs, and Antipoison Creeks

First TAC and Public Meeting

September 29, 2008
Kilmarnock, VA

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

What is a TMDL?

TMDL = <u>T</u>otal <u>M</u>aximum <u>D</u>aily <u>L</u>oad = maximum amount of a pollutant that can enter a waterbody without violating water quality standards (WQS)

WQS = numeric or narrative limits on pollutants that ensure the protection of human health and of aquatic life

Why are TMDL studies necessary?

- TMDLs must be developed for water bodies that do not meet water quality standards (impaired waters).

- Impaired waters occur throughout Virginia in lakes, streams, and tidal waters.

- In Virginia, TMDLs for 210± impaired waters must be developed by 2010.

 - Of these, 25± are shellfish TMDLs under a consent order.

DEQ
VIRGINIA DEPARTMENT OF
ENVIRONMENTAL QUALITY

What information is used to develop a TMDL?

- VDH Sanitary Shoreline Survey
- VDH Bacteria monitoring data
- Population estimates for humans, pets, wildlife, livestock (Census, VIMS, DCR, DGIF, & the public)
- Affected waters volume
- Bacterial Source Tracking Data (BST)
- Land Use, Climate, Tide, etc.
- DEQ permit data
- DEQ spill response and remediation data

Virginia's TMDL Development Process

- Public notice for TMDL development
- TMDL study
- Public notice for Draft TMDL
- Final TMDL report
- EPA approval
- Implementation process

==>   **Many opportunities for public input and participation**!**
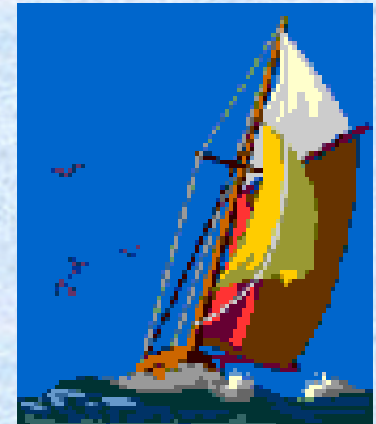
People involved in the Process:

- Virginia Department of Health - Division of Shellfish Sanitation

- Virginia Department of Conservation and Recreation

- Virginia Department of Environmental Quality

- Other State Agencies, Local Governments and Planning Districts

- U.S. Environmental Protection Agency and other appropriate federal agencies

- Citizens groups, educational institutions environmental groups, & local business

- **YOU!**

Why is a TMDL needed for the Indian, Dymer, Tabbs & Antipoison Creeks Watersheds?

- ❑ VDH Division of Shellfish Sanitation (DSS) monitors fecal coliform levels in shellfish waters

- ❑ Applicable water quality standards

    - ❑ 30-month geometric mean not exceeding 14 MPN/100 mL

    - ❑ <u>and</u> a 90th percentile not exceeding 49 MPN/100 mL

- ❑ The portions of Indian, Dymer, Tabbs, and Antipoison Creeks that currently fail these standards are:
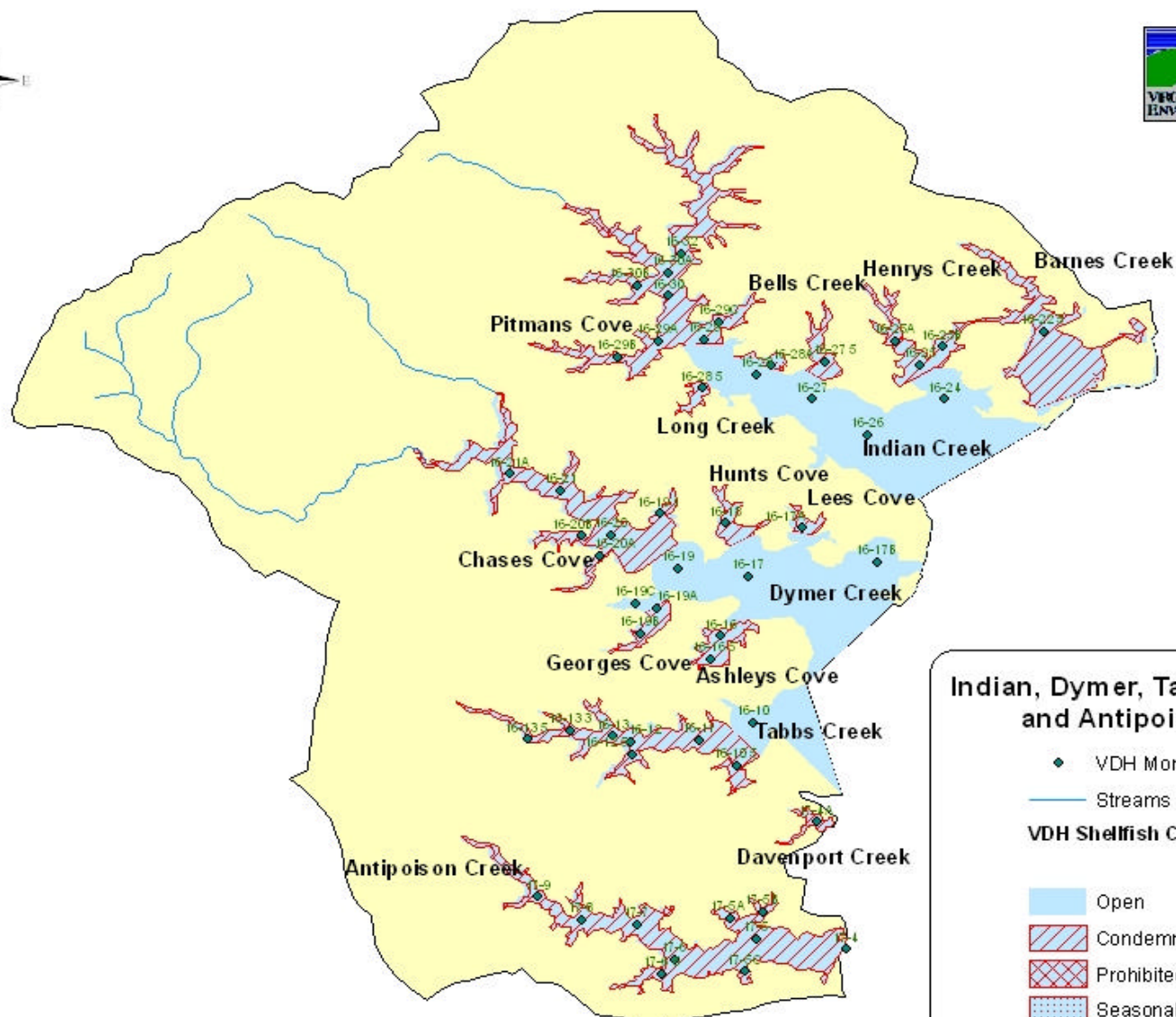
Indian, Dymer, Tabbs, Davenport, and Antipoison Creeks

Water Quality Data Summary for Indian Creek

90th Percentile represents the more stringent reduction

Creek Name	Station	Total Observations (1/mo)	Geometric Mean	Station Violates Geometric Standard: 14 MPN	90th Percentile	Station Violates 90th Percentile Standard: 49 MPN
Indian Creek Main Stem	16-26	262	5.30	No	28.78	No
	16-27	262	7.64	No	52.36	Yes
	16-28	263	8.03	No	43.45	No
	16-29	262	15.36	Yes	117	Yes
	16-30	264	28.21	Yes	453.09	Yes
	16-30A	264	39.73	Yes	484.86	Yes
	16-32	209	51.42	Yes	767.50	Yes
Barnes Creek	16-22_5	42	13.04	No	79.40	Yes
Henrys Creek	16-24	261	6.07	No	22.05	No
	16-25	259	11.20	No	71.78	Yes
	16-25A	44	13.00	No	69.03	Yes
	16-25B	44	8.87	No	62.37	Yes
Bells Creek	16-27_5	52	12.84	No	68.54	Yes
Long Creek	16-28_5	44	10.66	No	93.20	Yes
Unamed Cove	16-28A	26	NA	No	NA	No
Pitmans Cove	16-29A	261	31.09	Yes	365.02	Yes
	16-29B	259	66.46	Yes	680.92	Yes
Waverly Cove	16-30B	262	58.05	Yes	854.23	Yes
Arthur Cove	16-29C	44	9.38	No	54.63	Yes

Water Quality Data Summary for Dymer Creek

90th Percentile represents the more stringent reduction

Creek Name	Station	Total Observations (1/mo)	Geometric Mean	Station Violates Geometric Standard: 14 MPN	90th Percentile	Station Violates 90th Percentile Standard: 49 MPN
Dymer Creek Main Stem	16-17	262	5.75	No	21.53	No
	16-19	207	8.30	No	46.06	No
	16-20	262	14.69	Yes	97.74	Yes
	16-21	262	32.03	Yes	280.51	Yes
	16-21A	254	66.26	Yes	606.66	Yes
Ashley Cove	16-16	261	11.09	No	66.10	Yes
	16-16_5	44	6.26	No	40.69	No
Lees Cove	16-17A	110	16.81	Yes	103.87	Yes
Rones Bay	16-17B	44	4.08	No	11.43	No
Hunts Cove	16-18	262	13.60	No	81.47	Yes
Georges Cove	16-19A	259	11.32	No	127.55	Yes
	16-19B	251	13.87	No	103.17	Yes
Poplar Neck Creek	16-19C	256	8.92	No	46.93	No
Johnsons Cove	16-19_1	262	26.87	Yes	341.73	Yes
Unamed Cove	16-20A	45	23.82	Yes	236.48	Yes
Chases Cove	16-20B	42	19.09	Yes	173.64	Yes

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Water Quality Data Summary for Tabbs Creek

90th Percentile represents the more stringent reduction

Creek Name	Station	Total Observations (1/mo)	Geometric Mean	Station Violates Geometric Standard: 14 MPN	90th Percentile	Station Violates 90th Percentile Standard: 49 MPN
Tabbs Creek	16-10	262	8.06	No	46.82	No
	16-10_5	44	9.00	No	49.65	Yes
	16-11	262	13.28	No	87.00	Yes
	16-12	259	37.82	Yes	349.15	Yes
	16-12_5	43	18.85	Yes	170.17	Yes
	16-13	257	63.18	Yes	553.19	Yes
	16-13_5	254	133.66	Yes	1015.53	Yes

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Water Quality Data Summary for Antipoison Creek

90th Percentile represents the more stringent reduction

Creek Name	Station	Total Observations (1/mo)	Geometric Mean	Station Violates Geometric Standard: 14 MPN	90th Percentile	Station Violates 90th Percentile Standard: 49 MPN
Antipoison Creek Main Stem	17-3	118	3.92	No	9.03	No
	17-4	260	12.54	No	104.64	Yes
	17-5	260	8.66	No	45.67	No
	17-6	260	12.67	No	96.69	Yes
	17-7	260	14.91	Yes	86.70	Yes
	17-8	259	24.12	Yes	159.83	Yes
Unamed Cove North	17-5A	43	10.95	No	63.57	Yes
	17-5B	44	17.64	Yes	112.09	Yes
Unamed Cove South	17-5C	43	13.71	No	77.04	Yes
Davenport Creek	17-4A	79	27.25	Yes	283.89	Yes
Harpers Creek	17-6_5	44	10.94	No	85.20	Yes

Land Use in the Cumulative Watershed

Indian, Dymer, Tabbs, and Antipoison Creeks

Landuse - VA NLCD

- Unclassified
- Open Water
- Urban
- Barren or Mining
- Transitional
- Forest
- Agriculture - Pasture
- Agriculture - Cropland
- Other Grasses
- Wetlands
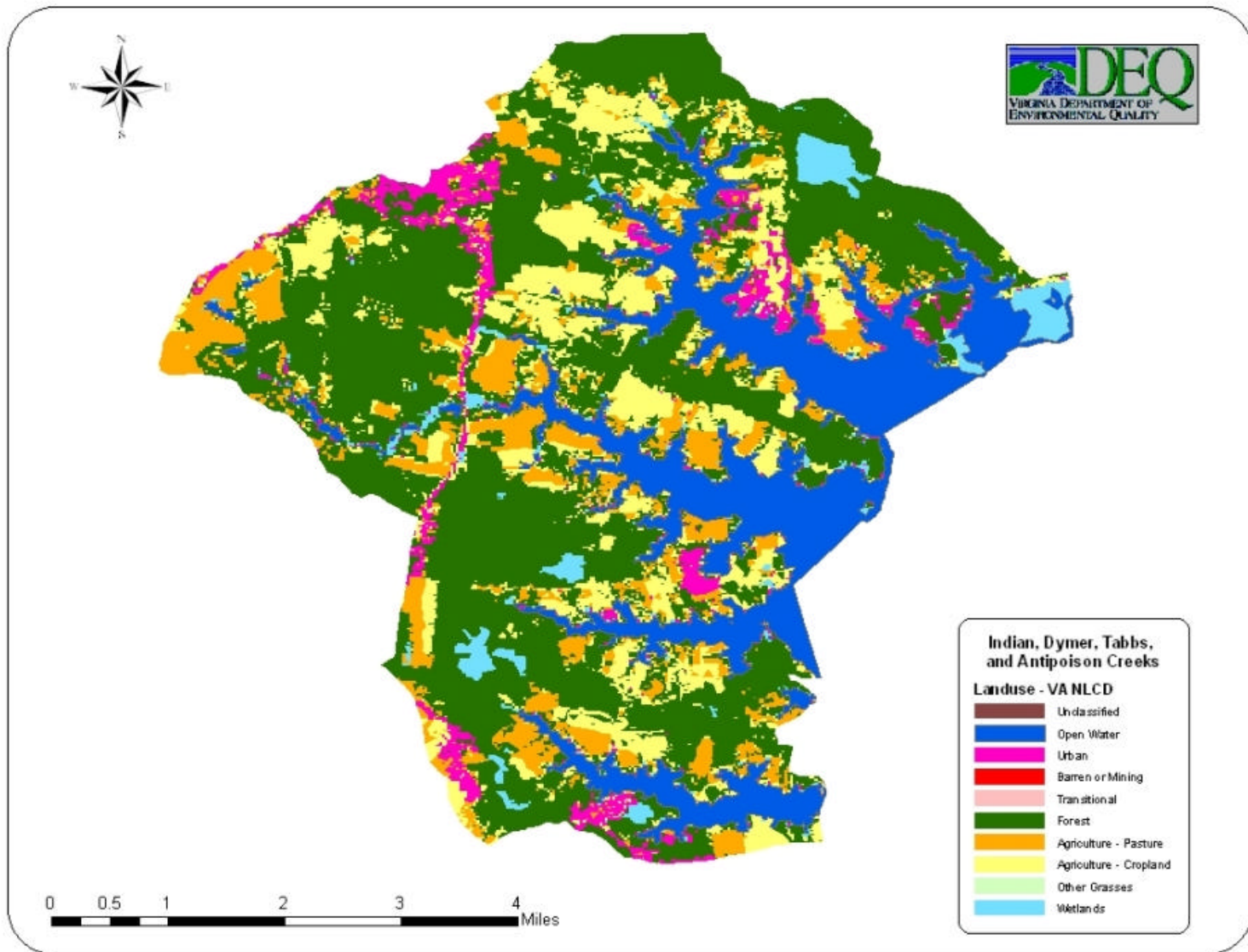
Figure 3.2 Indian Creek Land Use Percentages by Type

Legend: Open Water, Urban, Transitional, Forest, Ag-Pasture, Ag-Cropland, Wetlands

5%, 22%, 17%, 6%, 0%, 7%, 43%
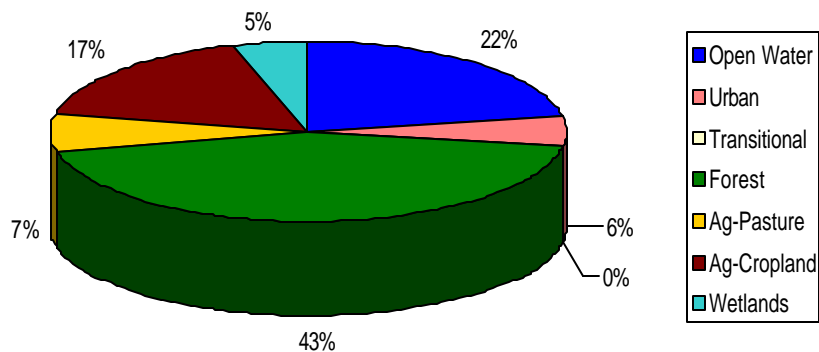
Figure 3.4 Tabbs Creek Land Use Percentages by Type

Legend: Open Water, Urban, Transitional, Forest, Ag-Pasture, Ag-Cropland, Wetlands

4%, 18%, 3%, 0%, 16%, 11%, 48%

Figure 3.3 Dymer Creek Land Use Percentages by Type

Legend: Open Water, Urban, Transitional, Forest, Ag-Pasture, Ag-Cropland, Wetlands

2%, 17%, 4%, 0%, 13%, 16%, 48%
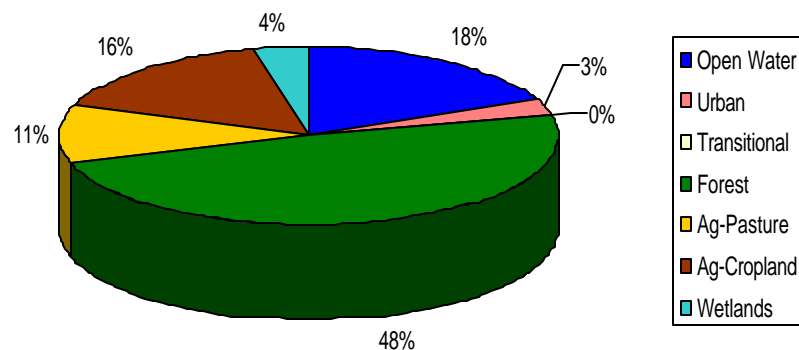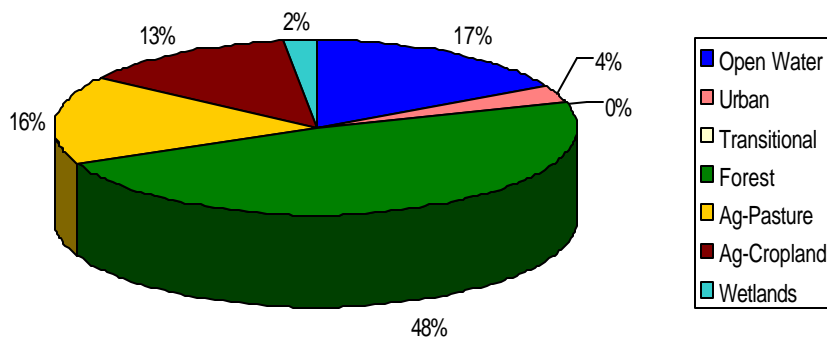
Figure 3.5 Antipoison Creek Land Use Percentages by Type

Legend: Open Water, Urban, Transitional, Forest, Ag-Pasture, Ag-Cropland, Wetlands

4%, 16%, 6%, 0%, 12%, 14%, 48%
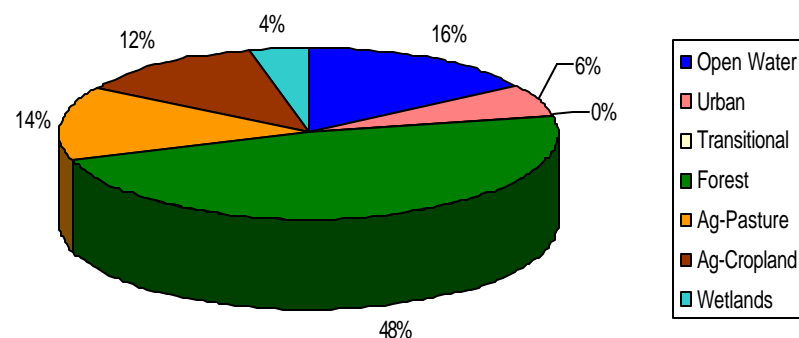
Tidal Volumetric Model + BST TMDL Approach

- ◻ Calculate volume of impaired water

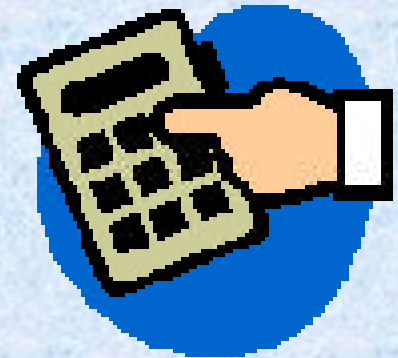- ◻ Calculate the acceptable loading;

    Water Quality Standard (WQS) x Volume

- ◻ Calculate actual loading;

    Critical fecal count   x   Volume

- ◻ Source determination;

    Fecal samples collected for BST are subjected
    to Antibiotic Resistance Analysis (ARA)
    and compared with known fecal samples

DEQ
VIRGINIA DEPARTMENT OF
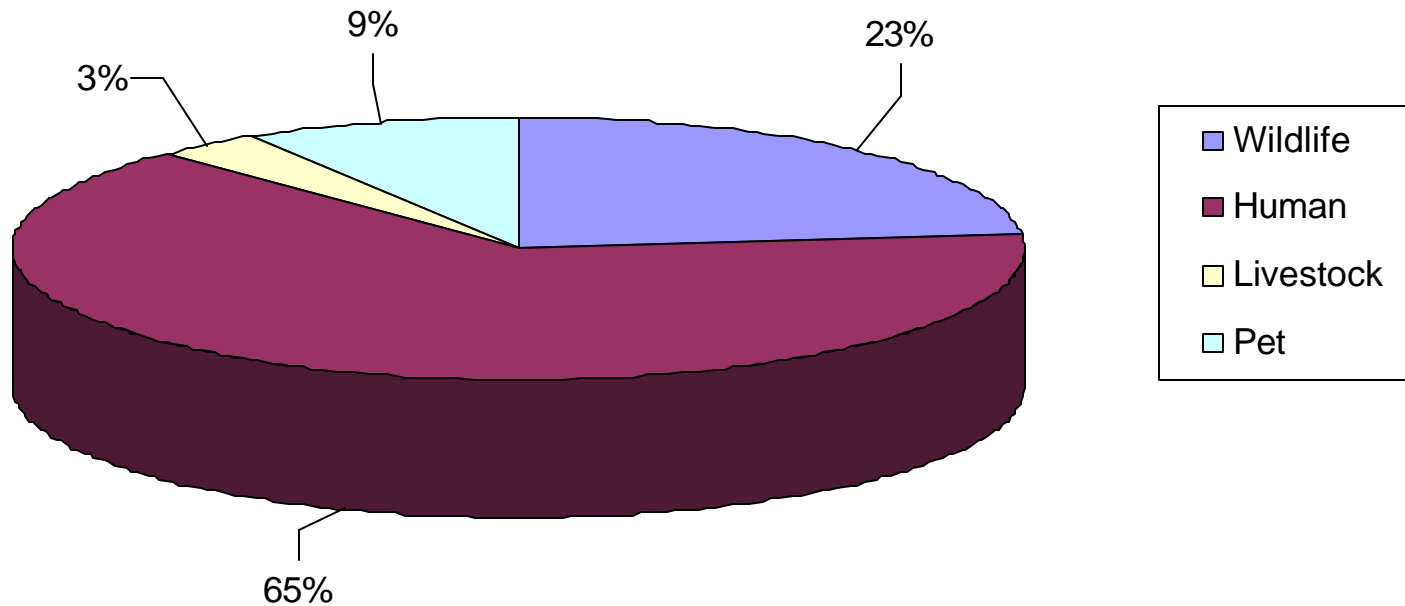ENVIRONMENTAL QUALITY

Use of Bacterial Source Tracking in TMDLs

- VDH-DSS monitoring data is used to calculate critical fecal count
- Supplementary BST samples at selected stations are used to help identify bacteria sources
- Antibiotic Resistance Analysis - BST method for source load allocation into 4 categories:

1. **Human**
2. **Pets**
3. **Livestock**
4. **Wildlife**

Weighted Indian Creek BST Sources

**Indian Creek and Tributaries Volume, Isolate, & Concentration Weighted BST by Source Type**

Pie chart data:
- 23% — Wildlife
- 65% — Human
- 3% — Livestock
- 9% — Pet

Legend:
- Wildlife
- Human
- Livestock
- Pet

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Weighted Dymer Creek BST Sources

**Dymer Creek and Tributaries Volume, Isolate, &
Concentration Weighted BST by Source Type**

22%

41%

26%

11%

Legend:
- Wildlife
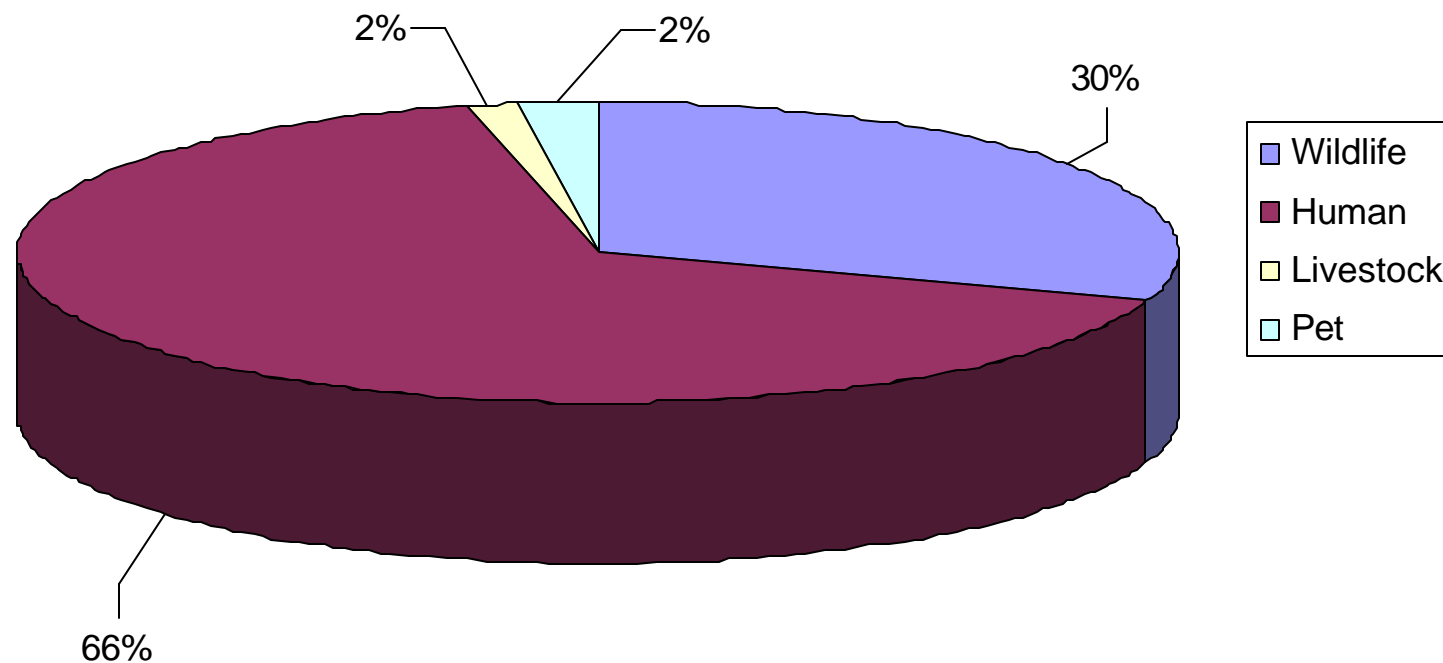- Human
- Livestock
- Pet
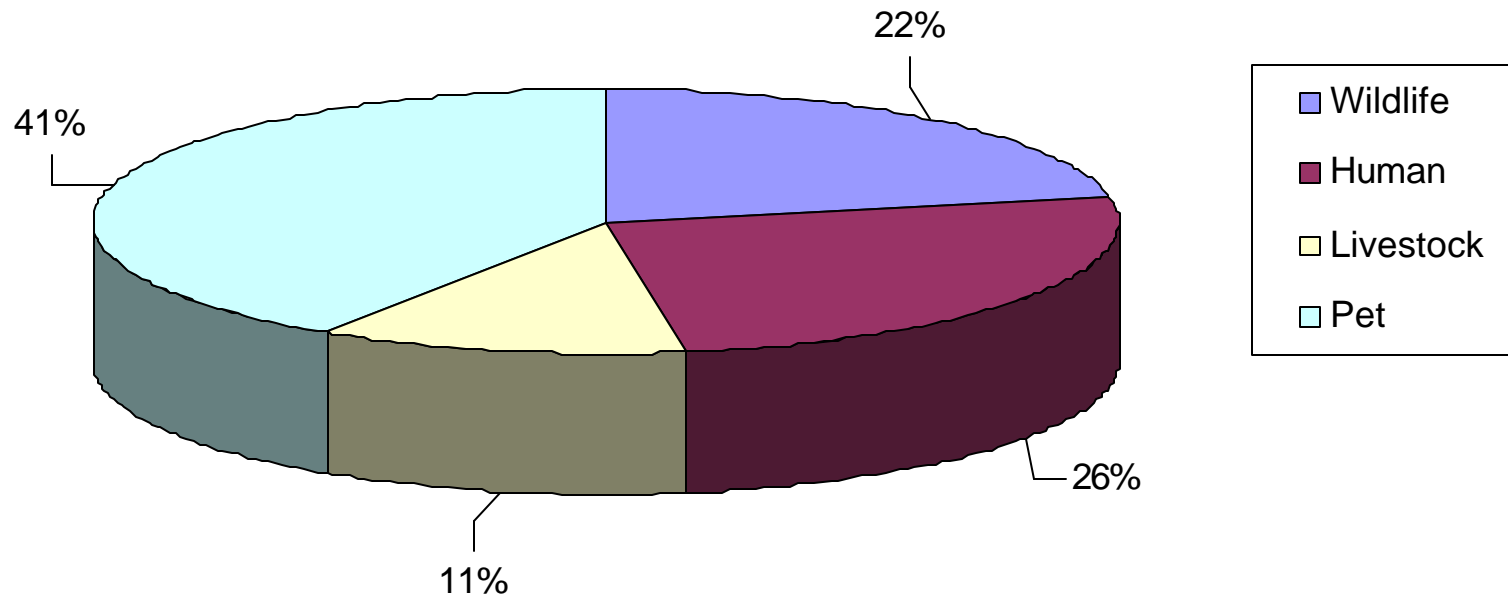
Weighted Tabbs Creek BST Sources

**Tabbs Creek Volume, Isolate, & Concentration
Weighted BST Percentages by Source Type**
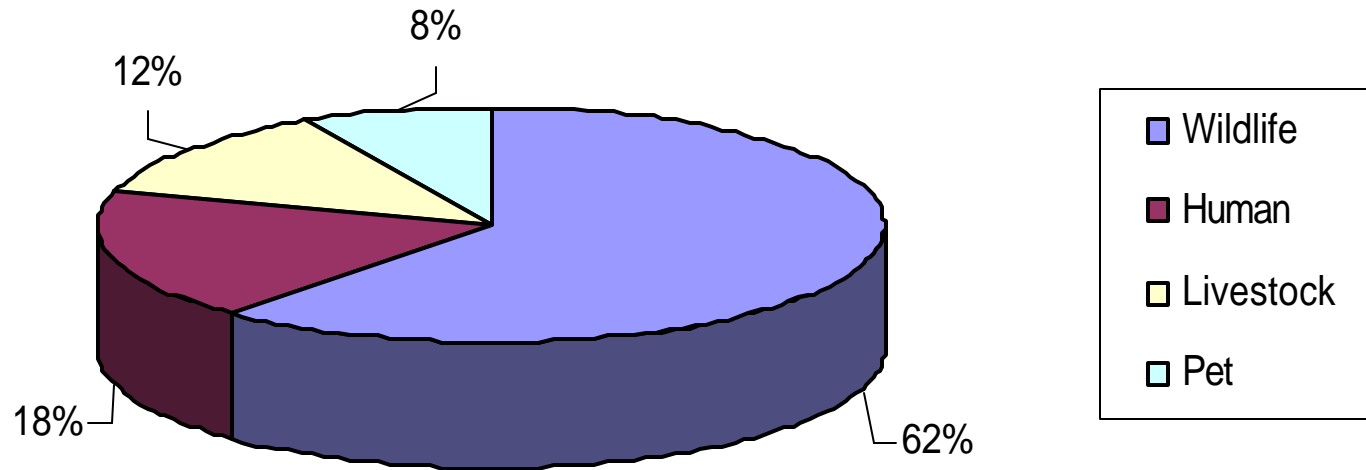
Weighted Antipoison Creek BST Sources

**Antipoison Creek Volume, Isolate, & Concentration Weighted BST by Source Type**

Legend:
- Wildlife
- Human
- Livestock
- Pet

2% — 2% — 30% — 66%

Population Estimates

Census 2006 Human Population Estimate	
Kilmarnock	1201
White Stone	344

Creek	Cattle	Chickens	Horses	Dogs	Deer	Racoons	Ducks	Geese
Indian Creek	23	8	1	128	117	170	846	630
Dymer Creek	19	3	1	162	171	211	403	345
Tabbs Creek	5	1	0	43	45	49	239	178
Antipoison Creek	9	2	1	75	77	89	316	235

Next Steps…

- ❑ **30 Day Public Comment Period**
  - ■ Ends October 29th, 2008
  - ■ Comments must include the name, address, and telephone number of the commenter. All comments will receive a written response and will be incorporated into the final report that will be sent to EPA.

- ❑ **TMDL Development Continues…**

- ❑ **Final Public Meetings**
  - ■ Planning for Mid – November

- ❑ **Final 30 Day Public Comment Period**

- ❑ **Report Submitted to EPA for approval**

- ❑ **Implementation Planning (scheduling by DCR)**
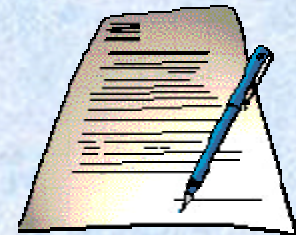
Questions?? Comments??

Please send written comments or questions to:

DEQ - Piedmont Regional Office

Attn: Margaret Smigo

4949-A Cox Road

Glen Allen, VA 23060

Email: mjsmigo@deq.virginia.gov

TMDL Website: http://www.deq.virginia.gov/tmdl

DEQ

VIRGINIA DEPARTMENT OF
ENVIRONMENTAL QUALITY